United States Environmental Protection Agency

Office of Water
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Human Health Ambient Water Quality Criteria: 2015 Update

Summary

EPA published final updated ambient water quality criteria for the protection of human health for 94 chemical pollutants. These updated recommendations reflect the latest scientific information and EPA policies, including updated body weight, drinking water consumption rate, fish consumption rate, bioaccumulation factors, health toxicity values, and relative source contributions. EPA accepted written scientific views from the public from May to August 2014 on the draft updated human health criteria and has published responses to those comments. EPA water quality criteria serve as recommendations to states and tribes authorized to establish water quality standards under the Clean Water Act.

Background

Ambient water quality criteria developed by EPA under Clean Water Act section 304(a) represent specific levels of chemicals or conditions in a water body that are not expected to cause adverse effects to human health. EPA is required to develop and publish water quality criteria that reflect the latest scientific knowledge. These criteria are not rules, nor do they automatically become part of a state's water quality standards. States may adopt the criteria that EPA publishes, modify EPA's criteria to reflect site-specific conditions, or adopt different criteria based on other scientifically-defensible methods. EPA must, however, approve any new water quality standards adopted by a state before they can be used for Clean Water Act purposes.

In this 2015 update, EPA revised 94 of the existing human health criteria to reflect the latest scientific information, including updated exposure factors (body weight, drinking water consumption rates, fish consumption rate), bioaccumulation factors, and toxicity factors (reference dose, cancer slope factor). The criteria have also been updated to follow the current EPA methodology for deriving human health criteria (USEPA 2000). EPA also developed chemical-specific science documents for each of the 94 chemical pollutants. The science documents detail the latest scientific information supporting the updated final human health criteria, particularly the updated toxicity and exposure input values. Specific updates are described below.

Due to outstanding technical issues, EPA did not update human health criteria for the following chemical pollutants at this time: antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium (III or VI), copper, manganese, methylmercury, nickel, nitrates, nitrosamines, N-nitrosodibutylamine, N-nitrosodiethylamine, N-nitrosopyrrolidine, N-nitrosodimethylamine, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, polychlorinated biphenyls (PCBs), selenium, thallium, zinc, or 2,3,7,8-TCDD (dioxin).

It is important for states and authorized tribes to consider any new or updated section 304(a) criteria as part of their triennial review to ensure that state or tribal water quality standards reflect current science and protect applicable designated uses. EPA recently proposed revisions to its water quality

standards regulations that would, if finalized without substantive change, require states during their triennial reviews to consider new or updated section 304(a) recommended criteria and, if they do not adopt new or revised criteria for such pollutants, provide an explanation to EPA as to why the state did not do so. These final updated human health criteria recommendations supersede EPA's previous recommendations.

Updated Exposure Inputs

Body Weight

EPA updated the default body weight for human health criteria to 80 kilograms based on National Health and Nutrition Examination Survey (NHANES) data from 1999 to 2006 (USEPA 2011). This represents the mean body weight for adults ages 21 and older. EPA's previously recommended default body weight was 70 kilograms, which was based on the mean body weight of adults from the NHANES III database (1988-1994).

Drinking Water

EPA updated the default drinking water consumption rate to 2.4 liters per day based on NHANES data from 2003 to 2006 (USEPA 2011). This represents the per capita estimate of community water ingestion at the 90th percentile for adults ages 21 and older. EPA previously recommended a default drinking water consumption rate of 2 liters per day, which represented the per capita community water ingestion rate at the 86th percentile for adults surveyed in the US Department of Agriculture's 1994-1996 Continuing Survey of Food Intake by Individuals (CSFII) analysis and the 88th percentile of adults in the National Cancer Institute study of the 1977-1978 Nationwide Food Consumption Survey.

Fish Consumption

EPA updated the default fish consumption rate to 22 grams per day. This rate represents the 90th percentile consumption rate of fish and shellfish from inland and nearshore waters for the U.S. adult population 21 years of age and older, based on NHANES data from 2003 to 2010 (USEPA 2014). EPA's previously recommended rate of 17.5 grams per day was based on the 90th percentile consumption rate of fish and shellfish from inland and nearshore waters for the U.S. adult population and was derived from 1994-1996 CSFII data.

As described in EPA's human health criteria methodology (USEPA 2000), the level of fish consumption in highly exposed populations varies by geographical location. Therefore, EPA suggests a four preference hierarchy for states and authorized tribes that encourages use of the best local, state, or regional data available to derive fish consumption rates. EPA recommends that states and authorized tribes consider developing criteria to protect highly exposed population groups and use local or regional data in place of a default value as more representative of their target population group(s). The preferred hierarchy is: (1) use of local data; (2) use of data reflecting similar geography/ population groups; (3) use of data from national surveys; and (4) use of EPA's default consumption rates.

Bioaccumulation Factors

EPA's methodology for deriving human health criteria emphasizes using, when possible, measured or estimated bioaccumulation factors (BAFs), which account for chemical accumulation in aquatic organisms from all potential exposure routes (USEPA 2000). Unlike bioconcentration factors, BAFs account for more exposure pathways than direct water contact. As a result, the updated criteria will better represent exposures to pollutants that affect human health. In order to account for the variation in bioaccumulation that is due to trophic position of the organism, EPA's methodology (USEPA 2000) recommends that BAFs be determined and applied to three trophic levels of fish.

EPA selected BAFs using a framework for deriving national trophic level-specific BAFs (USEPA 2000; USEPA 2003). EPA used field-measured BAFs and laboratory-measured bioconcentration factors available from peer-reviewed, publicly available databases to develop national BAFs. If this information was not available, EPA selected octanol-water partition coefficients (Kow values) from peer-reviewed sources for use in calculating national BAFs. As an additional line of evidence, EPA reported model-estimated BAFs for every chemical based on

the Estimation Program Interface (EPI) Suite (USEPA 2012) to support the field-measured or predicted BAFs.

Updated Health Toxicity Values

EPA considered all available toxicity values for both noncarcinogenic and carcinogenic toxicological effects to develop the updated human health criteria. EPA's Integrated Risk Information System (IRIS) was the primary source for reference dose and cancer slope factors for this update. For some pollutants, however, more recent toxicity assessments were provided by EPA's Office of Water, EPA's Office of Pesticide Programs, and international or state agencies. EPA followed a systematic process to search for and select the toxicity values used to derive the final updated human health criteria for noncarcinogenic and carcinogenic effects.

Relative Source Contribution

EPA updated the human health criteria to reflect chemical-specific relative source contributions (RSC) ranging from 20 to 80 percent following the Exposure Decision Tree approach described in EPA's methodology (USEPA 2000). EPA recommends inclusion of an RSC when developing human health criteria for threshold non-carcinogens or non-linear carcinogens. The RSC allows a percentage of the reference dose's exposure to be attributed to ambient water and fish consumption (including fish and shellfish from inland and nearshore waters) when there are other potential exposure sources. The rationale for this approach is that the objective of the water quality criteria is to ensure that an individual's total exposure from all sources does not exceed the criteria. Exposures outside of the RSC include, but are not limited to, exposure to a particular pollutant from ocean fish consumption (not included in the fish consumption rate), non-fish food consumption (meats, poultry, fruits, vegetables, and grains), dermal exposure, and respiratory exposure.

Where can I find more information?

To access the Federal Register notice, the final updated criteria, and supporting documents visit EPA's National Recommended Human Health Criteria website at: http://water.epa.gov/scitech/swguidance/standards/criteria/health/.

References

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